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(54) Shoulder prosthesis with meniscal component

(57) Shoulder joint prosthesis comprising a metal (eg cobalt-chrome alloy) humeral component 10 and glenoid component 20 separated by a high-density polyethylene meniscal component 30. The meniscal component 30 is movably interengaged with the glenoid component 20 using a projection 38 which snap fits into the glenoid recess 26. Play between the projection 38 and the recess 26 allows the meniscal component 30 to move with respect to the glenoid component 20 allowing self-alignment of the prosthesis components thus improving joint motion in use and reducing surgery times.

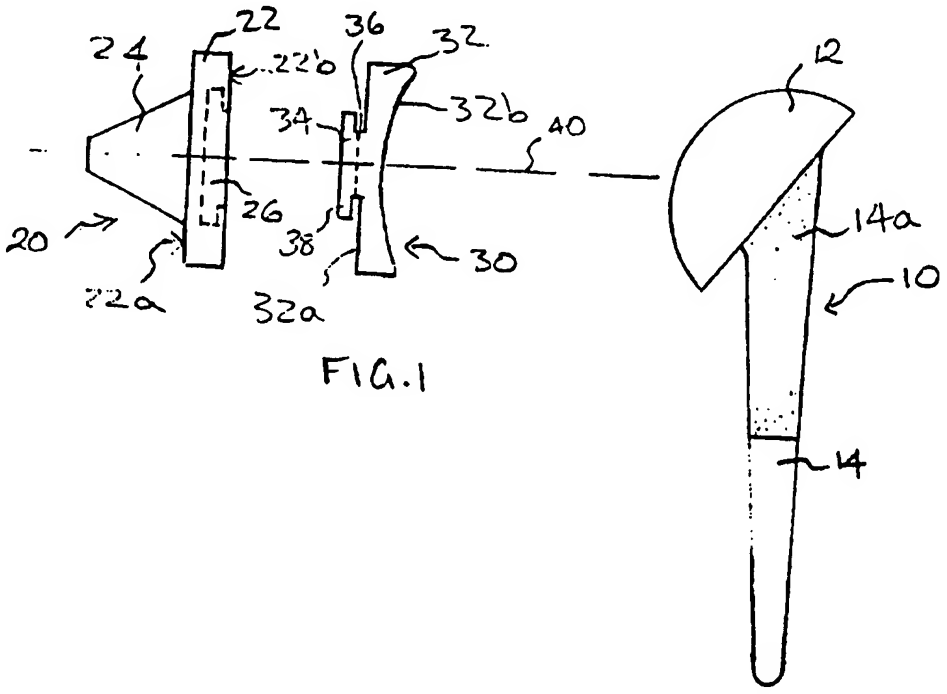

FIG.1

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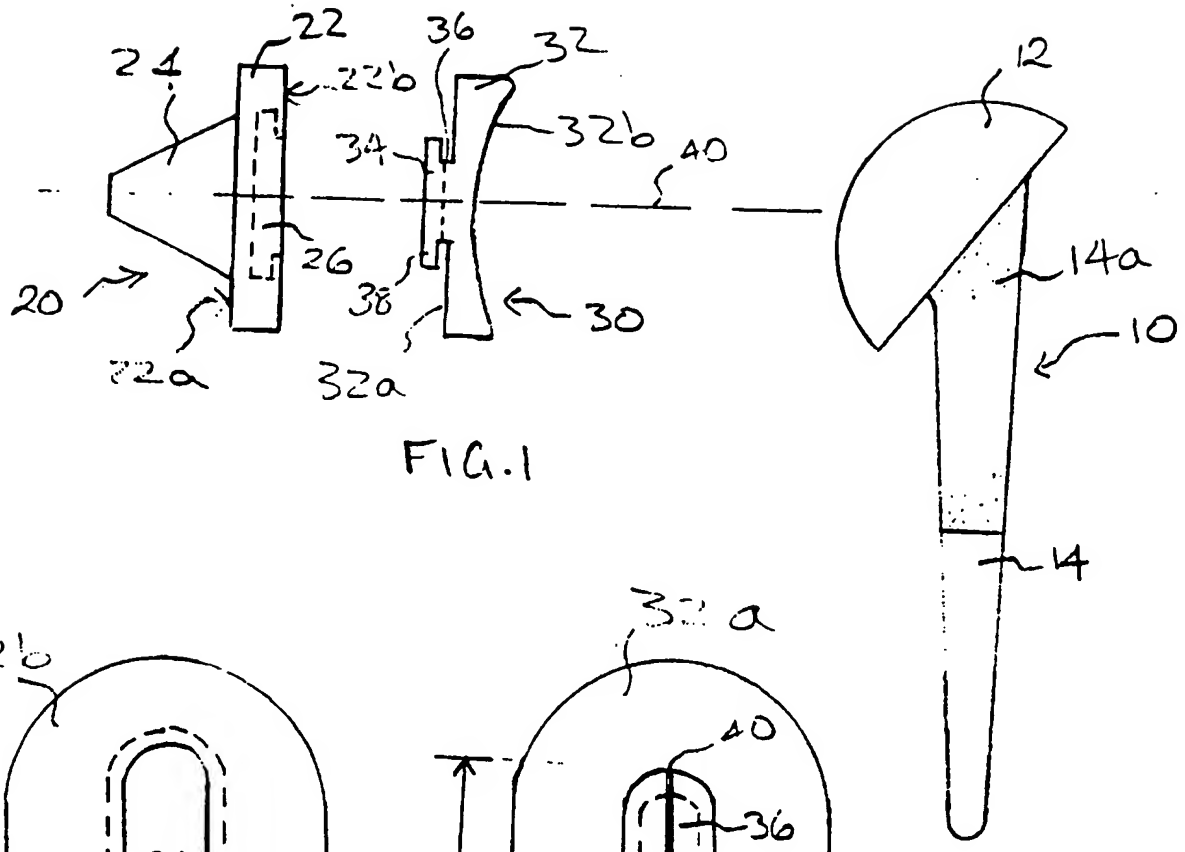

FIG.1

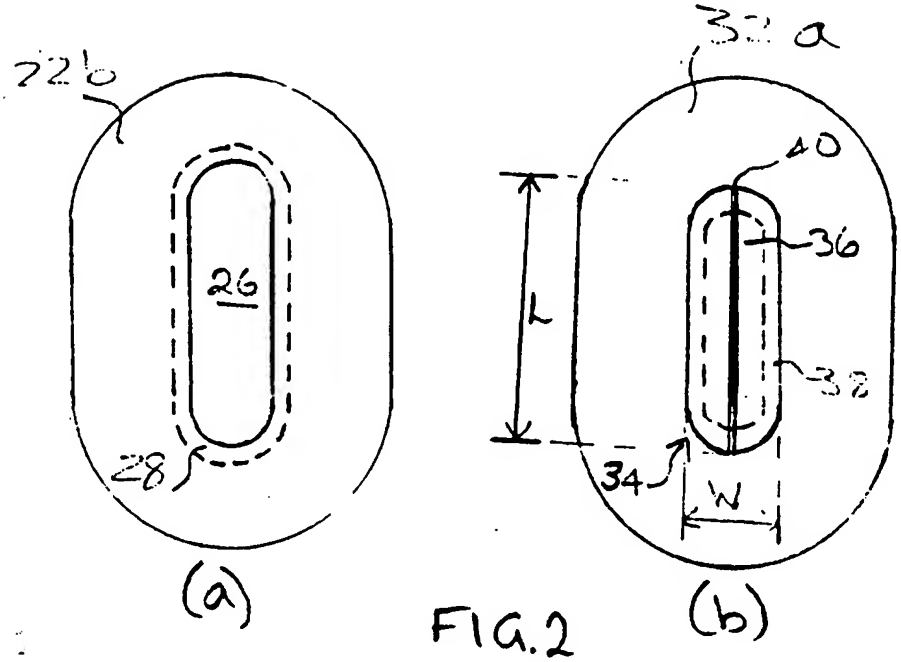

FIG.2

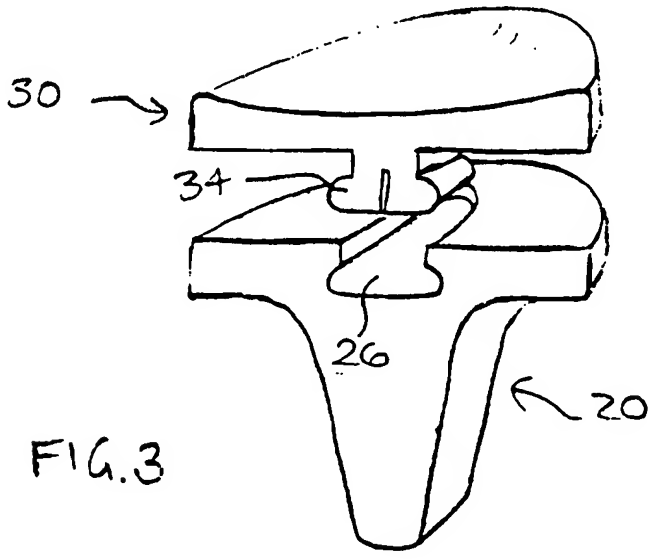

FIG.3

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SHOULDER PROSTHESIS

The invention relates to a shoulder prosthesis.

Shoulder prostheses usually consist of two components; a glenoid component and a humeral component. The humeral component comprises a part-spherical head, which is designed to replace the natural head of the humerus, and a fixing stem by means of which the component is fixedly attached to the humerus. The glenoid component has a concave articulation surface designed to cooperate with the head of the humeral component and a fixing stem by means of which the glenoid component can be fixedly attached to the scapula so as to replace at least part of the glenoid cavity.

The humeral component is usually made from metal with at least the head having a highly polished finish. The glenoid component can be made entirely from a suitable plastics material, such as ultra high molecular weight polyethylene, or can be made substantially from metal with only the articulation surface being finished in plastics.

A disadvantage of known shoulder prostheses is that they do not mimic the movements of a natural glenohumeral joint particularly well. A natural humeral

head both rolls and rotates with respect to the glenoidal cavity during movement of the humerus with respect to the scapula. Also, known shoulder prostheses require accurate alignment during implantation if adequate operation is to be achieved. This leads to extensive manipulative tests being carried out during implantation which increases the duration of the implantation procedure.

An object of the invention is to provide a shoulder prosthesis which more nearly emulates the natural movements of the glenohumeral joint than known shoulder prostheses.

The invention provides a shoulder prosthesis as claimed in claim 1. Preferred and advantageous features of the invention are set out in the subsidiary claims.

The provision of the movable meniscal component between the glenoid and humeral components means that self alignment between these components can take place under the influence of forces generated during the relative movement of the humerus and scapula. This freedom to self align allows the prosthesis to emulate the natural movements of the glenohumeral joint more closely than previously known prostheses. The self alignment also means that slight misalignments of the glenoid and humeral components can be tolerated which therefore allows the implantation procedure to be less stringent with regard to manipulative tests. This can

reduce valuable surgery time.

An embodiment of the invention will now be described with reference to the accompanying drawings, wherein:

Figure 1 is an exploded side view of a shoulder prosthesis according to the invention;

Figure 2a is a plan view, shown on an enlarged scale, of the surface of the glenoid component of Figure 1 facing the meniscal component;

Figure 2b is a plan view, shown on an enlarged scale, of the surface of the meniscal component shown in Figure 1 facing the glenoid component; and

Figure 3 is a perspective sectional view of the glenoid and meniscal components shown in Figures 1 and 2.

A shoulder prosthesis according to the invention is shown in Figure 1. The prosthesis comprises a humeral component 10, a glenoid component 20 and a meniscal component 30. The humeral component 10 comprises a part-spherical head portion 12 which is formed from metal, preferably a cobalt-chrome alloy, and has a highly polished finish. Extending away from the rear of the head portion 12 is a fixing stem 14. The fixing stem 14 has a coated or textured proximal region 14a to facilitate secure fixing of the humeral component 10 in a prepared canal in the humerus of the recipient. Alternative features can be incorporated to achieve a similar enhanced fixing effect; ribs or alternative shapings can be provided on the stem 14 or else the

entire shaft can be coated or textured. Fixing enhancements are well known and do not form part of the present invention.

The glenoid component 20 consists of a generally oval base component 22 and a fixing component 24 extending rearwardly from the base component 22. The fixing component 24 is of standard design and manufacture and is illustrated in this embodiment as a wedge-shaped projection. Textures and/or surface shapings can be applied to the projection 24 and, if desired, to the rear surface 22a of the base portion 22. Such shapings and texturings are well known and will not be described any further here.

The front surface 22b of the base portion 22 is generally planar except for a recess 26 located therein. The recess 26 is arranged substantially centrally of the front surface 22b and is generally oval in shape. The recess 26 has an undercut groove 28 extending around the entire periphery thereof.

The glenoid component 20 is preferably manufactured from a suitable metal, such as a cobalt-chrome alloy, and the base component 22 preferably has a highly polished finish. However, the glenoid component 20 can also be manufactured from a suitable plastics material.

The meniscal component 30 is manufactured from a suitable plastics material such as ultra high molecular weight polyetheylene. The meniscal component 30 has a

base component 32 having a rear surface 32a and a front surface 32b. The front surface 32b is arcuate in nature and is designed to co-operate with the part-spherical surface of the head portion 12 of the humeral component 10. Appropriate shapes and curvatures of such articulation surfaces 32b are well known from the prior art.

The rear surface 32a of the meniscal component 30 is shown on an enlarged scale in Figure 2b. A protrusion 34 is located substantially centrally of the generally oval surface 32a and the projection 34, seen in plan view, is also generally oval in shape.

The projection 34 essentially comprises a neck 36 and a head 38, the head 38 being larger than the neck 36 in all directions in the plane of Figure 2b. The depth of the head 38 is dimensioned such that the head 38 will fit into the undercut groove 28 of the recess 26 of the glenoid component 20. Also, the length L of the head 38 of the projection 34 is such that the projection 34 can pass into the recess 26 in the glenoid component 20. However, the unstressed width W of the head 38 of the projection 34 is slightly greater than the width of the opening of the recess 26. A slot 40, extending from the distal end of the projection 34 towards the base component 32, provides sufficient resilience in the projection 34 for the head 38 to pass into the recess 36 by a snap-fitting action.

Figure 3 illustrates the connection between the meniscal component 30 and the glenoid component 20. The projection 34 is introduced into the recess 26 by pressing the components together with sufficient force to cause a minor resilient deformation of the two halves of the projection 34 towards one another. Once inside the recess 26, the separate halves of the projection 34 spring away from one another so as to maintain a connection between the meniscal component 30 and the glenoid component 20. However, the relative dimensions of the opening of the recess 26 and the neck 36 of the projection 34, and of the head 38 of the projection 34 and the undercut groove 28 of the recess 26, are such that, when the projection 34 is located in the recess 26, there is a considerable amount of play in all directions between the meniscal component 30 and the glenoid component 20. The rear surface 32a of the meniscal component 30 is able to glide across the front surface 22b of the glenoid component 20 in any direction in the plane of the interface between the surfaces 22b and 32a. The meniscal component 30 can perform superior-inferior movement, anterior-posterior movement and even rotation about the axis 40 shown in Figure 1. The extent of movement in any direction is limited by the relative dimensions of the projection 34 and the recess 26.

The relative movement which is allowed between the

meniscal component 30 and the glenoid component 20 allows a certain amount of self-alignment of the articulation surface 32b of the glenoid component 30. Thus, when the humeral component 10 rolls or rotates when in use, the meniscal component 30 can re-align itself so as to minimise any forces occurring parallel to the plane of interface between the glenoid and meniscal components 20,30. This reduces the risk of dislocation of the prosthesis components and also ensures smoother manipulation of the components.

A further advantage, as mentioned above, is that small amounts of misalignment between the glenoid component 20 and the humeral component 10 can be tolerated. This means that the manipulative tests normally carried out during the implantation procedure can be curtailed to some extent and the duration of the surgery can therefore be reduced.

It will be appreciated that the invention is not limited to the specific embodiment described above. Firstly, the shape and configuration of the interengaging means (the recess 26 and projection 34 in the specific embodiment described above) can be altered as desired. More than one recess and projection can be provided or, in some cases, the interengaging means can be omitted completely. In this case, the meniscal component 30 would have a planar surface capable of gliding across a corresponding planar surface located on

the glenoid component 20. The meniscal component 30 would be held in place between the glenoid component 20 and the humeral component 10 merely by compressing forces acting between these components.

The fixing stems 14 and 24 of the humeral and glenoid components 10, 20 can be replaced by any alternative suitable fixing components, eg. bone screws. Furthermore, the head portion 12 of the humeral component 10 can be made removable so that alternative heads of different sizes and configurations can be provided if necessary.

CLAIMS

1. A shoulder prosthesis comprising a humeral component and a glenoid component, wherein a meniscal component is provided between the humeral component and the glenoid component, the meniscal component being movable with respect to the glenoid component.

2. A shoulder prosthesis as claimed in claim 1, wherein the meniscal component is movable anteriorly-posteriorly with respect to the glenoid component.

3. A shoulder prosthesis as claimed in claim 1 or 2, wherein the meniscal component is movable superiorly-inferiorly with respect to the glenoid component.

4. A shoulder prosthesis as claimed in any one of claims 1 to 3, wherein the meniscal component is movable rotationally with respect to the glenoid component.

5. A shoulder prosthesis as claimed in any one of the preceding claims, wherein the relative movement between the glenoid component and the meniscal component is limited.

6. A shoulder prosthesis as claimed in any one of the

preceding claims, wherein interengaging means are provided to retain the meniscal component in contact with the glenoid component in use.

7. A shoulder prosthesis as claimed in claim 6, wherein the interengaging means comprise a projection located on the meniscal component and a recess located in the glenoid component, the projection engaging with play in the recess.

8. A shoulder prosthesis as claimed in claim 7, wherein the projection engages in the recess in a snap-fit manner.

9. A shoulder prosthesis as claimed in any one of the preceding claims, wherein the meniscal component is manufactured from ultra high molecular weight polyethylene.

10. A shoulder prosthesis as claimed in any one of the preceding claims, wherein the glenoid and humeral components are manufactured from metal.

11. A shoulder prosthesis substantially as hereinbefore described with reference to the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9501343.9
Relevant Technical Fields (i) UK Cl (Ed.N) A5R RAD, RAP (ii) Int Cl (Ed.6) A61F 2/40, 2/30	Search Examiner MR S J PILLING Date of completion of Search 8 MARCH 1995
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE: WPI	Documents considered relevant following a search in respect of Claims :- 1-11

Categories of documents

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Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	E:	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	&:	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2166654 A	(ONI & MACKENNEY) page 1 lines 3 to 80 and Figure 1	1-4, 9 & 10

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